



December 2009  
LBPD01A-KIT

## VDSL2 PoE Ethernet Extender Kit, PD

### Extend Ethernet with 100-/60-Mbps downstream/ upstream connections over copper.

Kit includes two extenders—one with standard power and one that's a PoE powered device (PD).

Bridges 10BASE-T/100BASE-TX Ethernet interface.

Supports DSL connection up to 4000 feet (1219 m).

Select from Fast and Interleaved modes.

Provides low latency for video/voice/data applications.

IEEE 802.3af PoE compliant.

#### Customer Support Information

Order toll-free in the U.S.: Call 877-877-BBOX (outside U.S. call 724-746-5500) •  
FREE technical support 24 hours a day, 7 days a week: Call 724-746-5500 or fax 724-746-0746 •  
Mailing address: Black Box Corporation, 1000 Park Drive, Lawrence, PA 15055-1018 •  
Web site: [www.blackbox.com](http://www.blackbox.com) • E-mail: [info@blackbox.com](mailto:info@blackbox.com)

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We're here to help! If you have any questions about your application or our products, contact Black Box Tech Support at **724-746-5500** or go to **blackbox.com** and click on "Talk to Black Box." You'll be live with one of our technical experts in less than 20 seconds.

### Federal Communications Commission and Industry Canada Radio Frequency Interference Statements

This equipment generates, uses, and can radiate radio-frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

## Normas Oficiales Mexicanas (NOM) Electrical Safety Statement

### INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquear la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deberá ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.
12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
  - A: El cable de poder o el contacto ha sido dañado; u
  - B: Objectos han caído o líquido ha sido derramado dentro del aparato; o
  - C: El aparato ha sido expuesto a la lluvia; o
  - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
  - E: El aparato ha sido tirado o su cubierta ha sido dañada.

**European Community (CE) Electromagnetic Compatibility Directive**

This equipment has been tested and found to comply with the protection requirements of European Emission Standard EN55022/EN61000-3 and the Generic European Immunity Standard EN55024.

EMC:

EN55022(2003)/CISPR-2(2002): Class A

IEC61000-4-2 (2001): 4 KV CD, 8 KV AD

IEC61000-4-3(2002): 3 V/m

IEC61000-4-4(2001): 1 KV (power line), 0.5 KV (signal line)

# VDSL2 PoE Ethernet Extender Kit, PD

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## 1. Specifications

**Data Rate (Maximum):** 100/60 Mbps

**Transmission Distance (Maximum):** 4000 ft. (1219 m)

**Flow Control:** Half-/full-duplex

**MDI-X:** Automatic

**Standards:** ITU-T G.993.1/2, SG15Q4 DMT compliant, trellis code with 1024 DMT bins, EMI emissions compliant, FCC Class A, CE, IEEE 802.3/IEEE 802.3u Ethernet, 10BASE-/100BASE-TX, IEEE 802.3af PoE

**PoE Power Reception Supports:** Endpoint: Via twisted-pair: Pins 1, 2, 3, 6;

Midspan: Via twisted-pair: Pins 4, 5, 7, 8

**Connectors:** PD: (1) RJ-11, (1) RJ-45;

Standard: (1) RJ-11, (2) RJ-45

**Indicators:** PD: (4) LEDs: Power, LAN, DSL, M/S;

Standard: (5) LEDs: Power, LAN1, LAN2, DSL, M/S

**Power Input:** PD: 100mA @ -48 VDC from IEEE 802.3af PSE or PoE injector;

Standard: 5 VDC, 1 amp

**Temperature Tolerance:** Operating: 32 to 122° F (0 to 50° C)

**Humidity Tolerance:** 5 to 95% noncondensing

**Size:** 0.8" H x 4.7" W x 3.5" D (2 x 12 x 9 cm)

# VDSL2 PoE Ethernet Extender Kit, PD

## 2. Overview

### 2.1 Introduction

The LBPD01A-KIT is a VDSL LAN Extender that provides broadband transmission rates up to 100-/60-Mbps for downstream/upstream over single-pair copper line for point-to-point Ethernet connectivity. The kit includes two extenders—one with standard power and one that's a PoE powered device (PD). The PD extender draws its power from a Power over Ethernet (PoE) switch, so you can easily integrate it into a PoE infrastructure without using another power outlet. The LBPD01A-KIT is ideal for high-bandwidth applications such as LAN-to-LAN, video streaming, FTTB, and MDU/MTU over single twisted-pair telephone lines.

At 100-/60-Mbps downstream/upstream, the LBPD01A-KIT supports transmission distances up to 500 feet (152.4 meters) and at 28-/0.3-Mbps it supports distances up to 4000 feet (1219 m). Using its Power over Ethernet (PoE) feature, the VDSL2 PoE Ethernet Extender (PD) derives power over the Ethernet cable from power sourcing equipment (PSE), such as a PoE Ethernet Switch, so it may work without an external power adapter.

Installation is plug-and-play. You can configure each LBPD01A-KIT as either master for central side (CO) or slave for remote side (RT) by using the DIP switch settings. The LBPD01A-KIT conforms to the ITU-T G.993.1 and G.993.2 to meet VDSL/VDSL2 and SG15Q4 DMT for network requirements.

### 2.2 Features

- ITU-T G.993.1, G.993.2, VDSL/VDSL2, and SG15Q4 DMT compliant
- 100-/60-Mbps downstream/upstream for up to 500 feet (152.4 m)
- Supports DSL connection up to 4000 feet (1219 m) at 28/0.3 Mbps
- Trellis coding support for up to 1024 Discrete Multi-Tone (DMT) bin
- Selectable Fast and Interleaved modes
- Selectable fixed data rate and fixed SNR margin
- Auto MDI-X for 10BASE-T/100BASE-TX Ethernet LAN Port, so you don't need a crossover cable on the Ethernet side
- IEEE 802.3af PoE compliant
- 4 DIP switches for master/slave configuration
- Low latency for video/voice/data applications

### 2.3 Application

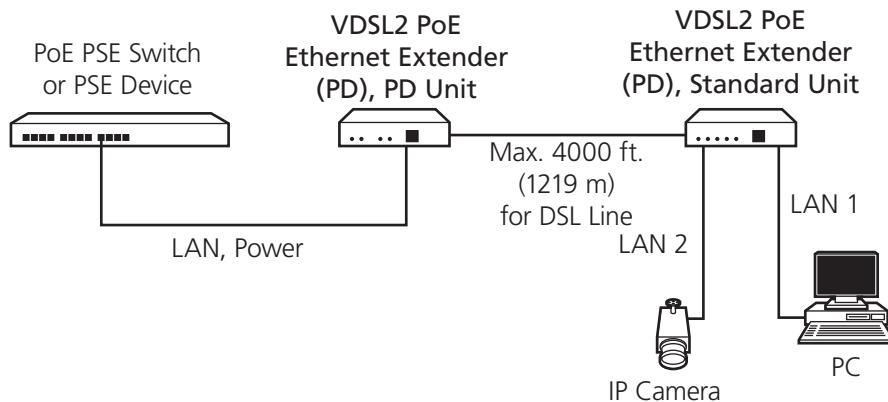


Figure 2-1. Typical application.

### 2.4 What's Included

Your package should include the following items. If anything is missing or damaged, please contact Black Box Technical Support at 724-746-5500.

- (1) VDSL2 PoE Ethernet Extender (PD)
- (1) VDSL2 PoE Ethernet Extender (Standard)
- (1) 5-VDC, 1-A power adapter for VDSL2 PoE Ethernet Extender (Standard)
- This user's manual on CD-ROM

### 2.5 LED Descriptions

Table 2-1. LED indicators.

LED	Color	Function
POWER	Green	Lights when power is on.
DSL	Green	Lights when VDSL is connected.
M/S	Green	Lights when the device is in slave mode. Off when device is in master mode.
LAN	Green	Lights when Ethernet connection is made. Blinks when transmitting/receiving data.

## VDSL2 PoE Ethernet Extender Kit, PD

### 2.6 Front and Back Panels

Figures 2-2 through 2-5 show the extenders' front and rear panels.

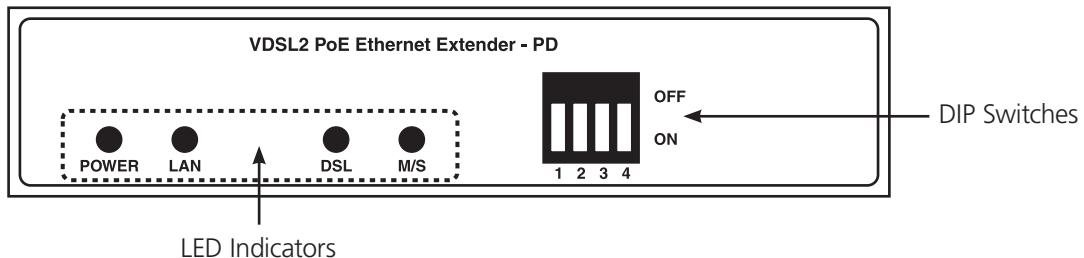


Figure 2-2. Front panel, VDSL2 PoE Ethernet Extender (PD), PD unit.

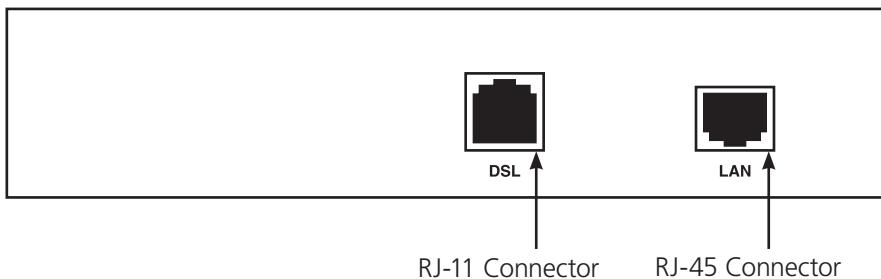


Figure 2-3. Rear panel, VDSL2 PoE Ethernet Extender (PD), PD unit.

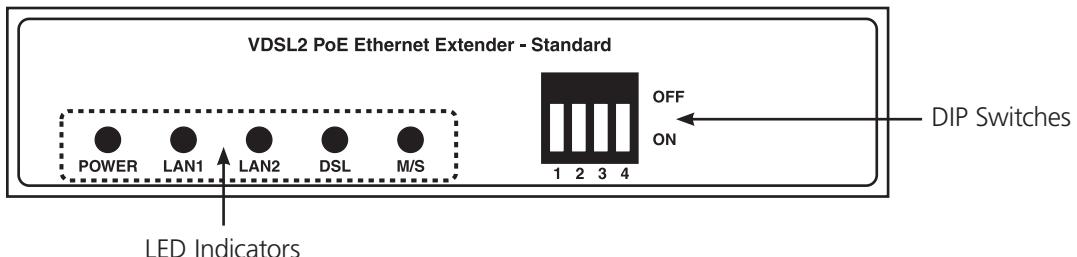


Figure 2-4. Front panel, VDSL2 PoE Ethernet Extender (PD), Standard unit.

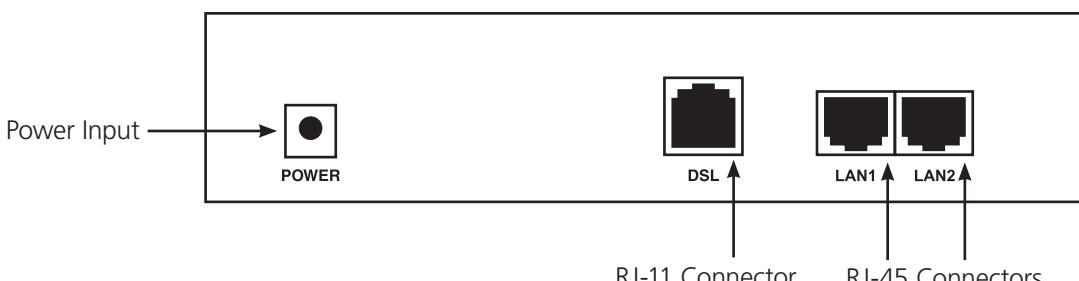


Figure 2-5. Rear panel, VDSL2 PoE Ethernet Extender (PD), Standard unit.

### 3. Installation

Because the VDSL2 PoE Ethernet Extenders are preconfigured for basic applications, you can install them quickly. Follow these steps:

1. Connect the line interface between the units with RJ-11 cable.
2. Connect the Standard Extender to a twisted-pair Ethernet connection. Connect the PD Extender to a PoE PSE switch or other PSE device using copper twisted-pair cable.

NOTE: Make sure that the PSE device is turned on, or the VDSL2 PoE Ethernet Extender (PD) will not work.

3. Connect the power adapter to the Standard extender and plug it in.

NOTE: The interconnecting cables should be rated for external use and appropriate for the application's voltage, current, anticipated temperature, flammability, and mechanical serviceability.

Table 3-1 shows the data rate and transmission distance information via 26 AWG at 6 dB.

Table 3-1. Supported data rates and transmission distances.

Downstream Data Rate (Mbps)	Upstream Data Rate (Mbps)	Distance (feet)
100	60	500
98	53	1000
90	44	1250
80	36	1500
70	27	1750
60	18	2000
48	11	2500
39	8	3000
35	3.5	3500
28	0.3	4000

NOTE: Depending on your application, you might need to change the DIP switches for optimum performance.

# VDSL2 PoE Ethernet Extender Kit, PD

## 4. DIP Switches

Table 4-1 describes the DIP Switches. Select the switches for optimal configuration.

Table 4-1. DIP switches and their functions.

DIP Switches	SW-1	SW-2	SW-3	SW-4
Definition	Master/Slave	Impulse Noise Protection Mode	Data Rate	SNR
Off	Master	Interleaved	50/20 Mbps	9 dB
On	Slave	Fast	Full Rate	6 dB

Standard extender



PD extender



Figure 4-1. DIP switches' default settings.

Table 4-2. DIP switches' descriptions.

### SW-1: CO/Remote

Off: VDSL2 PoE Ethernet Extender will act as the master side.

On: VDSL2 PoE Ethernet Extender will act as the slave side.

### SW-2: Mode for impulse noise protection

Off: Interleaved mode provides impulse noise protection for any impulse noise with a duration less than 250 µs.  
Interleaved mode has a maximum end-to-end latency of 10 ms. Interleaved mode is the default mode.

On: Fast mode guarantees a minimum end-to-end latency less than 1 ms.

### SW-3: Rate limit control

Off: Line rate limited to 50/20 Mbps.

On: Provides up to 100-/60-Mbps line rate at distances up to 500 feet (152.4 m).

### SW-4: Signal-to-noise ratio (SNR)

Off: Higher SNR margin (9 dB) will result in fewer errors with a more stable VDSL link.

On: Original and normal channel noise protection with 6 dB SNR.

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